

## AMENDMENTS TO THE SPECIFICATION:

Page 1, please add the following new paragraphs before paragraph [0001]:

[0000.2] CROSS-REFERENCE TO RELATED APPLICATIONS

[0000.4] This application is a 35 USC 371 application of PCT/DE 03/01370  
filed on April 29, 2003.

[0000.6] BACKGROUND OF THE INVENTION

Please replace paragraph [0001] with the following amended paragraph:

[0001] ~~Prior Art~~ Field of the Invention

Please replace paragraph [0002] with the following amended paragraph:

[0002] The invention is ~~based on a~~ directed to an improved fuel injection valve for internal combustion engines ~~of the kind known from the prior art, such as German Published, Nonexamined Patent Application DE 196 18 650 A1. In a valve body, a bore is embodied in which a pistonlike valve needle, which on its end toward the combustion chamber has a valve sealing face, is longitudinally displaceably. On the end toward the combustion chamber, the bore is defined by a valve seat, with which the valve sealing face of the valve needle cooperates and thus by its longitudinal motion controls the opening of at least one injection opening which is embodied on the end toward the combustion chamber of the valve body.~~

Please add the following new paragraph after paragraph [0002]:

[0002.2] Description of the Prior Art

Please add the following new paragraph after paragraph [0002.2]:

[0002.4] German Published, Nonexamined Patent Application DE 196 18 650 A1 discloses a fuel injection valve with a valve body having a bore in which a pistonlike valve needle, which on its end toward the combustion chamber has a valve sealing face, is longitudinally

displaceably. On the end toward the combustion chamber, the bore is defined by a valve seat, with which the valve sealing face of the valve needle cooperates and thus by its longitudinal motion controls the opening of at least one injection opening which is embodied on the end of the valve body toward the combustion chamber.

Page 2, please replace paragraph [0006] with the following amended paragraph:

[0006] **~~Advantages of the Invention~~**

**SUMMARY AND ADVANTAGES OF THE INVENTION**

Please replace paragraph [0007] with the following amended paragraph:

[0007] The fuel injection valve of the invention **~~having the definitive characteristics of claim 1~~** has the advantage over the prior art that the fuel injection valve has better drift behavior of the injection quantity and a longer service life. The valve sealing face of the valve needle and/or of the valve seat has microscopic indentations in the contact region, which lead to improved lubrication between the valve seat and the valve needle in the heavily loaded region. Purposefully adapting the microscopic indentations, which taken as a whole form microstructuring, to the tribologically relevant stress reduces wear at the valve seat and thus prolongs the life of the injection system.

Page 3, please add the following new paragraph after paragraph [0010]:

[0010.5] **BRIEF DESCRIPTION OF THE DRAWINGS**

Please replace paragraph [0011] with the following amended paragraph:

[0011] Further advantages and advantageous features of the subject of the invention **~~can be learned from the description and the drawing.~~** will become apparent from the description contained below, taken in conjunction with the drawings, in which:

Please delete paragraphs [0012] and [0013].

Page 4, please replace paragraph [0016] with the following amended paragraph:

[0016] Figs. 3a, 3b and 3c, ~~an are enlargements~~ **enlargement** of Fig. 2 in the detail marked III, for various exemplary embodiments; and

Please replace paragraph [0017] with the following amended paragraph:

[0017] Fig. 4 shows the same view as Fig. 2, with ~~screws~~ screw threads as the microscopic indentations.

Please replace paragraph [0018] with the following amended paragraph:

[0018] ~~Description of the Exemplary Embodiment~~

#### DESCRIPTION OF THE PREFERRED EMBODIMENTS

Page 5, please replace paragraph [0020] with the following amended paragraph:

[0020] By means of a device not shown in the drawing, a constant or chronologically varying closing force is exerted on the end toward the combustion chamber of the valve needle 5, so that the valve needle 5 is pressed with its valve sealing face 7 against the valve seat 9. This closing force acts counter to the hydraulic force that is exerted by the fuel pressure in the pressure chamber 19 on the pressure shoulder 13 and on parts of the valve sealing face 7. For controlling the longitudinal motion of the valve needle 5 in the bore 3, both of these forces are employed. If the hydraulic force on the valve needle 5 exceeds the closing force, then with its valve sealing face 7 the valve needle 5 lifts from the valve seat 9, and fuel flows out of the pressure chamber 19 through the injection openings 11 into the combustion chamber of the engine. If the closing force is increased or the hydraulic force is reduced, then the closing force on the valve needle 5 predominates, and with its valve sealing face 7 the valve needle 5

moves into contact with the valve seat 7 9, as a result of which the injection openings 11 are closed.

Page 6, please replace paragraph [0022] with the following amended paragraph:

[0022] The switching times of the valve needle 5 are very short: Since in high-speed internal combustion engines of the kind used in passenger cars, there can be more than 2000 injections per minute, one injection event lasts only approximately 1 ms. Strong forces and hence high accelerations therefore act on the valve needle 5 and cause the valve needle 5 to strike the valve seat 9 at high speed; in operation of the fuel injection valve, the sealing edge 30 is hammered into the valve seat 9 somewhat as a result, resulting in an adaptation between the valve sealing face 7 and the valve seat 9. The valve sealing face 7 and the valve seat 9 are therefore extremely heavily loaded mechanically. On the one hand, the seat region of the valve body 1 must not be excessively hard, so as to preclude breakage in this region. On the other hand, the sealing edge 30 must not be hammered excessively into the valve seat 9 in operation, since in that case the partial area of the valve sealing face 7 acted upon by fuel in the pressure chamber 19 would change and hence also the pressure at which the valve needle 5 is moved in the opening direction counter to the closing force would change. A change in this opening pressure also causes a change in the entire dynamics of opening, so that a precise injection is no longer assured.

Please replace paragraph [0023] with the following amended paragraph:

[0023] In injection valves in which high fuel pressure constantly prevails in the pressure chamber and hence also at the valve seat, pressure fluctuations result in still further stress. As a result of the closure of the valve needle, the fuel in the pressure chamber, which is flowing toward the valve seat, is braked abruptly, so that the kinetic energy is converted into

compression work, and as a consequence, pressure fluctuations occur, leading to a periodic stress in the region of the valve seat and the valve sealing face. ~~Fuel~~ Such fuel injection valves ~~stressed in this way~~ are used primarily in common rail injection systems. Moreover, in fuel injection valves in which the closing force on the valve needle is generated by the hydraulic pressure in a control chamber, pressure fluctuations can occur in this control chamber, which once again can lead to periodic forces on the valve needle in its closing position.

Page 8, please add the following new paragraph after paragraph [0028]:

[0029] The foregoing relates to a preferred exemplary embodiments of the invention, it being understood that other variants and embodiments thereof are possible within the spirit and scope of the invention, the latter being defined by the appended claims.